

CLAIMS

I claim:

- 5 1. A method for energy management comprising:
receiving energy rating data at an on-premise processor transmitted by a
distribution network from a host processor and storing the energy rating data in a
memory, the rating data including a schedule pertaining to time and energy costs;
receiving at the on-premise processor a message communicated using an
10 802.15.4-based wireless communication link from a power load controller requesting
energy rating data;
retrieving the energy rating data from the memory and sending a response
message including the energy rating data using the 802.15.4-based wireless
communications link from the on-premise processor to the power load controller; and
15 determining in the power load controller whether to generate an activation signal
based at least in part on the energy rating data.
2. The method of claim 1 wherein the activation signal activates a power load.
- 20 3. The method of claim 1 wherein the activation signal activates a power generator.
4. The method of claim 1 wherein the energy rating data further comprises a first
time period associated with a first usage rate and a second time period associated with a
second usage rate.
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5. The method of claim 2 wherein the power load controller determines whether to
activate the power load is based further at least in part on the current time.
6. The method of claim 1 wherein the distribution network transmits the rating data
30 wirelessly.

7. The method of claim 6 wherein the distribution network transmits the rating data wirelessly using an 802.15.4- based communications link.

8. A method for energy management, comprising:

5 sending an energy rate request message from an appliance using a 802.15.4-based wireless communication link

receiving an energy rate schedule at the appliance using the 802.15.4- based wireless communication link, the energy rate schedule comprising a first time period for a first usage rate and a second time period for a second usage rate; and

10 determining in the appliance whether to activate a power load based in part on the energy rate schedule and a current time.

9. The method of claim 6 further comprising:

storing the energy rate schedule in a memory in the appliance.

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10. A method for energy management comprising:

receiving at an on-premise processor a first request message communicated using an 802.15.4- based wireless communication link from a power load controller pertaining to energy rating data;

20 sending from the on-premise processor a second request message over a distribution network to the host processor pertaining to energy rating data;

receiving at the on-premise processor a first rating response message over the distribution network from the host processor, the second request message including energy rating data;

25 sending from the on-premise processor to the power load controller a second rating response message using the 802.15.4-based wireless communication link including the energy rating data; and

determining in the power load controller whether to generate an activation signal based at least in part on the energy rating data.

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11. The system of claim 10 wherein the activation signal activates a power load.

12. The system of claim 10 wherein the activation signal activates a power generator.

13. The system of claim 11 wherein the power load controller further determines
5 whether to activate the power load based on the current time.

14. The system of claim 10 wherein the energy rating data comprises a first time
period associated with a first usage rate and a second time period associated with a
second usage rate.

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15. The system of claim 11 wherein the power load activated is one from the group of
an air conditioning unit, an induction motor, a compressor, and a heating load.

16. A method of energy management comprising:

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receiving at an on-premise processor a power restriction status indicator
transmitted over a distribution network from a load management host processor and
storing the power restriction status indicator in a memory of the on-premise processor;
receiving a load authorization request communicated using an 802.15.4 -based
wireless communications link transmitted from a power load controller co-located with a
20 power load, the load authorization request received by the on-premise processor;
retrieving the power restriction status indicator data stored in the memory and
determining a restriction status;

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generating a response message authorizing or denying activation of the power
load based on the value of the restriction status, the response message including an
address associated with the power load controller; and
communicating the response message using the 802.15.4- based wireless
communications link from the on-premise processor to the power load controller.

17. The method of claim 16 wherein the power restriction status indicator comprises a
30 first value and a second value, the second value associated with a time duration.

18. The method of claim 16 further comprising:
recording in the memory a time associated with the generation of the response
message authorizing or denying activation of the power load.

5 19. The method of claim 16 wherein the on-premise processor is contained in a power
meter.

20. The method of claim 16 wherein the power load controller controls is at least one
of an air conditioning unit, an induction motor, and a heating load.

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21. The method of claim 20 further comprising:
the power load controller activating a power generator.

22. The method of claim 16 wherein the distribution network is one from the group of
15 paging network, digital cellular network, telephone network, power line carrier network,
Internet, 802.15.4-based wireless mesh LAN, and an 802.11X-based LAN.

23. A method for energy management, comprising:
20 receiving at an on-premise processor a power restriction indication communicated
from a load management host using a distribution network, the power restriction
indication stored in a memory of the on-premise processor;
receiving at the on-premise processor a first authorization request to activate a
power load communicated using an 802.15.4-based wireless communications link from a
25 power load controller controlling the power load;
determining in the on-premise processor a power restriction status based on the
power restriction indication data stored in the memory of the on-premise processor;
communicating a first response from the on-premise processor to the power load
controller using the 802.15.4-based wireless communications link authorizing power
30 load activation if the power restriction status is a first value;

communicating a second authorization request from the on-premise processor to the load management host processor using the distribution network indicating an address of the on-premise processor if the power restriction status is a second value;

receiving a second authorization response from the host processor at the on-
5 premise processor using the distribution network indicating an authorization or a denial of activation of the power load; and

sending a third authorization response from the on-premise processor using the 802.15.4-based wireless communications to the power load controller, the third authorization response message either authorizing activation of the power load if the
10 second authorization response authorizes activation of the power load, or denying activation of the power load if the second authorization response denies activation of the power load.

24. The method of claim 23 wherein the power restriction indication further
15 comprises a time duration.

25. The method of claim 23 where the step of determining in the on-premise processor a power restriction status further comprises processing a time indication.

20 26. The method of claim 23 further comprising:
receiving at the on-premise processor a second power restriction indication communicated from the load management host using a distribution network, the power restriction indication stored in the memory of the on-premise processor.

25 27. The method of claim 23 wherein the power load comprises at least one of a heating load, air conditioning load, or induction motor load.

28. A method for energy management comprising:
receiving at an on-premise processor a first authorization request message to
30 activate a power load, the first authorization message sent from a power load controller operatively connected to the power load;

sending a second authorization request message transmitted from the on-premise processor using a distribution network to a host processor indicating an address associated with the power load controller;

receiving a first authorization response message at the on-premise processor
5 transmitted using the distribution network from the host processor indicating authorization or denial of activating the power load;

generating in the on-premise processor a second authorization response message indicating an authorization or denial of activating the power load; and

10 sending the second authorization response message using the 802.15.4-based wireless communications link from the on-premise processor to the power load controller.

29. The method of claim 28 wherein the second authorization message further comprises a time duration.

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30. The method of claim 28 further comprising:
recording an indication of a time associated with the sending of the second authorization response message.

20 31. The method of claim 28 further comprising the step of
receiving an acknowledgment message from the power load controller at the on-premise processor using the 802.15.4-based wireless communications link to send the second authorization response message.

25 32. A method for energy management comprising:
sending a first notification message from a host processor to an on-premise processor indicating a request for energy management;
determining a first address in the memory of the on-premise processor;
communicating a first power control request message using an 802.15.4-based
30 wireless communications link incorporating the first address to a power load controller associated with the first address;

generating an energy management signal by the power load controller in response to the power control request message;

receiving a first acknowledgement message communicated using the 802.15.4-based wireless communications link from the power load controller to the on-premise processor; and

receiving a second acknowledgement message at the host processor, the second acknowledgement message sent by the on-premise processor in response to receiving the first acknowledgement message.

33. The method of claim 26 wherein the energy management signal deactivates a power load.

34. The method of claim 26 wherein the energy management signal activates a power generator.

35. The method of claim 32 wherein the content of the first acknowledgement message includes in part the content of the second acknowledgement message.

36. The method of claim 32 further comprising:

recording a time and address of the on-premise processor associated with the sending of the second acknowledgment message from the on-premise processor.

37. The method of claim 32 wherein the power control request message further comprises a time duration.

38. A method for energy management, comprising:

sending a first notification message of an impending power control request message to an on-premise processor from the power control host processor using an 802.15.4-based wireless communications link;

receiving a first acknowledgement message at a power control host processor from the power load controller using the 802.15.4-based wireless communications link;

sending a power control request message to the on-premise processor from the power control host processor using the 802.15.4-based wireless communications link requesting deactivation of the power load;

receiving a second acknowledgement message from the on-premise processor
5 acknowledging deactivation of the power load wherein the message is communicated using an 802.15.4-based wireless communications link; and

recording in the power control host processor a load deactivation indication in a data structure associated with the on-premise processor.

10 39. The method of claim 38 wherein the power control request message comprises a time duration.

40. The method of claim 39 further comprising:
activating the power load after the time duration.

15 41. A method to control a meter, comprising:
reading a first status indicator associated with an utility meter in a memory of a utility meter management host processor;

determining the status of the utility meter is active;

20 sending a first deactivation request message from the utility meter management host processor to an on-premise processor using a distribution network indicating a request to deactivate the utility meter;

generating deactivation message using a 802.15.4-based communications link to the utility meter;

25 deactivating the utility meter so that no output is available from the utility meter;
sending a first acknowledgement deactivation message from the on-premise processor to the utility meter management host processor using the distribution network, the acknowledgment confirming that output is no longer available from the utility meter;
and

30 recording in the memory of the utility meter management host processor a date and an activation status indicator associated with the utility meter.

42. The method of claim 41 wherein the first deactivation request message comprises a time duration.

5 43. The method of claim 41 wherein the utility meter is a gas meter.

44. The method of claim 41 wherein the utility meter is a water meter.

45. The method of claim 41 wherein the utility meter is a power meter.

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46. The method of claim 41 further comprising:

sending a second deactivation request message from the on-premise processor to a second utility meter indicating a request to deactivate the second utility meter using the 802.15.4-based wireless communications link;

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deactivating the second utility meter so that no output is available from the second utility meter; and

receiving a response at the on-premise processor from the second utility meter using the 802.15.4-based wireless communications link indicating the second utility meter is deactivated.

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47. A method to read a meter comprising:

sending a request message to an on-premise processor directing the on-premise processor to read energy related data from a power meter identified by a meter identification number using an 802.15.4-based wireless communications link;

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retrieving energy related data stored in a memory of the power meter by the on-premise processor using the 802.15.4-based wireless communications link and the meter identification number;

receiving a response message sent at a host processor communicated from the on-premise processor using the 802.15.4-based wireless communications link indicating the energy related data and the meter identification number; and

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recording the energy related data associated with the meter identification number in a data structure in memory of the host processor along with a date and a time information.

5 48. The method of claim 47 wherein the request message to an on-premise processor directing the on-premise processor to read energy related data from a power meter is sent from the host on a periodic basis.

49. The method of claim 47 wherein the energy related data is usage related.

10 50. A method for reading data from a utility meter, comprising:
storing a utility meter address and a utility meter reading schedule in an on-premise processor indicating a time to read data from at least one utility meter;
communicating a meter reading request message incorporating the utility meter
15 address from the on-premise processor to the utility meter using an 802.15.4-based wireless communications link at a time indicated by the meter reading schedule;
receiving a meter reading response message at the on-premise processor containing usage related data communicated using the 802.15.4-based wireless communications link; and
20 sending a meter reading report message from the on-premise processor to a host processor, the meter reading report message including usage data and the utility meter address.

25 51. The method of claim 50 wherein the utility meter comprises one from the group of water meter, gas meter, and power meter.

52. A method for a host processor to read measurement data from a utility meter, comprising the steps of:

30 receiving a first request message at the on-premise processor sent from the host processor requesting measurement data from an utility meter wherein the request includes a meter identifier associated with the utility meter;

sending a first acknowledgment message in response to the first request by the on-premise processor to the host processor indicating error free receipt of the first request;

sending a second request message from the on-premise processor to the utility meter communicated using a 802.15.4-based wireless communications link requesting
5 measurement data from the utility meter;

receiving a first response message at the on-premise processor from the utility meter communicated using the 802.15.4-based wireless communications link including the measurement data and a date;

sending a second acknowledgement message from the on-premise processor to the
10 host processor including the measurement data and the date; and

recording the measurement data and the date in a data structure associated with the meter identifier in the host processor.

53. The method of claim 52 further comprising:

15 erasing the measurement data from a memory in the on-premise processor.

54. A method for obtaining measurement data, comprising:

receiving periodic measurement data at a on-premise processor from a utility meter communicated using an 802.15.4-based wireless communications link containing a
20 utility meter identification number;

storing the measurement data and the identification number in a memory in an on-premise processor along with time-related data;

receiving a first request message at the on-premise processor from a host processor requesting the measurement data for the utility meter, the first request message
25 including the utility meter identification number;

retrieving the measurement data and the time-related data in the memory of the on-premise processor associated with the utility meter identification number; and

sending a reporting message from the on-premise processor to the host processor incorporating the measurement data, the utility meter identification number, and the time-
30 related data.

55. The method of claim 54 further comprising:

receiving an acknowledgment message from the host processor at the on-premise processor indicating receipt of the reporting message; and

erasing the measurement data and time-related data from the memory in the on-premise processor.

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56. A method for energy management, comprising:

determining in a load management host a need to reduce power consumption;

accessing a data base comprising power consumption related data, the power consumption related data associated with a power consumer;

10 selecting a specific power consumer, the specific power consumer identified in the database as participating in a load reduction program;

communicating from the load management host a load reduction request to the on-premise processor, the on-premise processor associated with the power consumer;

recording a load reduction notification indication in the power consumption

15 related data associated with the power consumer; and

determining whether a load threshold has been reached.

57. The method of claim 56 further comprising the step of:

receiving an indication of whether the on-premise processor is able to reduce

20 power consumption; and

recording an a load reduction value associated with the power consumer in the database.

58. The method of claim 56 further comprising the steps of:

25 determining whether the load reduction value indicator exceeds a threshold.

59. The method of claim 56 wherein the power consumer's bill is determined in part by the load reduction value in the database.

30 60. The method of claim 56 where the load reduction request comprises a specified time duration.

61. A system for managing power loads comprising:

a management host processor capable of communicating a load reduction request message to at least one of a plurality of on-premise processors;

5 a database operatively connected to the management host processor, the database containing energy related customer records, the records containing an address associated with at least one of a plurality of on-premise processors and an indication of whether the at least one of a plurality of on-premise processors is able to receive a load reduction request; and

10 a communications network operatively connected to the management host processor capable of communicating at least one load reduction request to the at least one on-premise processors as identified by the address.

62. The system of claim 61 wherein the database further comprises:

15 memory storing input power load data received at the at least one on-premise processor over the communications network, the management host processor comparing the power load data to a predefined threshold value stored in the memory.

63. A system for managing power loads, comprising:

20 a management host processor storing a plurality of records associated with a plurality of power meters including communication addressing data associated with the plurality of power meters and power-related usage data, the management host processor operatively connected to a distribution network capable of sending and receiving messages of a first protocol for the purpose of managing activation of a power load;

25 an on-premise processor operatively connected the distribution network receiving messages of a first protocol from the management host processor, the on-premise processor co-located with at one of the plurality of power meters, the messages of a first protocol for the purpose of managing activation of the power load, the on-premise processor including an 802.15.4-based wireless communications link interface for
30 sending and receiving messages of a second protocol to control activation of the power load; and

a power load controller associated with a power load operatively communicating with the on-premise processor using an 802.15.4-based wireless communications link to send and receive messages of a second protocol to control activation of the power load, the power load controller controlling activation of the power load.

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64. The system of claim 63 wherein the distribution network comprises at least one of a paging network, digital cellular network, 802.11X or 802.15.4-based wireless network, telephone network, cable based Internet, or power line carrier network.

10 65. The system of claim 63 wherein the power load comprises at least one of an induction motor load, heating load, or an air conditioning load.

66. A system for managing a utility meter, comprising:

15 a management host processor storing records associated with a plurality of utility meters including communication address data associated with the plurality of utility meters and measured usage data, the management host processor operatively connected to a distribution network capable of sending and receiving messages of a first protocol for controlling a specific utility meter; and

20 an on-premise processor operatively connected the distribution network receiving the messages of the first protocol from the management host processor, the on-premise processor using an 802.15.4-based wireless transceiver for sending and receiving messages of a second protocol to the specific utility meter, the messages of a second protocol including measurement data associated with the specific utility meter.

25 67. The system of claim 66 wherein the specific utility meter comprises a water meter, gas meter, or power meter.

68. The system of claim 66 wherein the message controlling the meter activates or deactivates the utility meter.

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69. The system of claim 66 wherein the management message controlling the meter returns a status indication of the meter.

70. A system for controlling a power load, comprising:

5 a processor capable of receiving a signal from a sensor, the signal related to an ambient temperature of the sensor, the processor further capable of generating a control signal;

an 802.15.4-based transceiver, operatively connected to the processor, capable of communicating data received from an antenna to the processor; and

10 a switch, operatively connected to the processor receiving the control signal from the processor, the switch controlling activation of a power load.

71. The system of claim 70 wherein the power load comprises at least one of an air conditioner, an inductive motor, a heating element, a light, a pump, or a compressor.

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72. The system of claim 70 wherein the sensor detects air temperature.

73. The system of claim 72 further comprising:

20 a display operatively connected to the processor, the display indicating the ambient air temperature detected by the sensor.

74. The system of claim 70 wherein the processor generates the control signal to the switch in response to receiving data from the 802.15.4-based transceiver.

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